

## Game protocol

Text written in *italics* is instructions given directly to the players. Normal text is instructions for the facilitators only. In the manuscript we refer to water-intensive and water-efficient crop. In the original game, we talk about wheat as the water-intensive crop and gram as the water-efficient crop.

### Materials needed:

Before you begin, make sure that the following materials are at hand:

- A computer device with Excel
- USB stick
- 1 laminated pay-off table as a poster
- 2 laminated results tables
- 15 laminated player's balance sheets
- 15 laminated Crop Choice Cards
- 15 laminated NREGA decision cards
- A set of 14 cards to assign the group composition and the player positions randomly
- Print outs of 25 record sheets
- 25.000 play Rupees in 1000 bills
- 7000 play Rupees in 500 bills
- 7000 play Rupees in 100 bills
- 3 dice
- 20 pens
- 20 non-permanent markers
- 3 cloths to clean the cards
- 10.000 real Rupees in small bills
- Receipt book or printouts
- 20 white envelopes
- 20 brown envelopes
- 15 name tags

### Registration of Players

Please note the names of all players and assign them player numbers in the order they register.

Use the Excel-Form tab “initial information” provided to the facilitator for this documentation. Please ask all players to draw one of the cards that assigns the group affiliation and the player position (Table 1).

**Table 1. Cards to assign group composition and player positions randomly**

Group Position 1	1,	Group Position 1	2,
Group Position 2	1,	Group Position 2	2,
Group Position 3	1,	Group Position 3	2,
Group Position 4	1,	Group Position 4	2,
Group Position 5	1,	Group Position 5	2,
Group Position 6	1,	Group Position 6	2,
Group Position 7	1,	Group Position 7	2,

Enter the group affiliation and player position in the Excel form. Make each player aware that under no circumstances should anyone in the group know her/his group affiliation and player position. Please also ask all players the question in the Excel form! Save the file repeatedly on the computer and a USB stick.

Please write the players' names on the nametags and distribute them. Please do not write the players' numbers on the nametag!

### **General Instructions to the Players**

*Is has come to our attention that the maintenance of stop-dams in the Mandla district is an issue. In our meetings thus far, people have mentioned that the dams can help the community a lot and that farmers experience a wide range of benefits because of them. At the same time, it was mentioned that some of the benefits are decreasing. Dams are filled with silt and overgrown with grass and bushes. Sluices are damaged. As a result, you experience fewer and fewer benefits in terms of groundwater recharge, surface irrigation water availability, and flood and soil erosion control. This is the main topic of this game!*

*The question is how to deal with this situation? We are aware that this is a difficult situation and we want to play a little game with you to explore this challenge jointly and develop ideas to ensure the continuous function of the watershed infrastructure.*

In which villages the players receive actual payments will be determined randomly. **In the villages that receive actual payments, you add the following explanation! Make sure that you do not read this statement at the sites where the players are not paid real money:** *[In this game, you can win real money of up to INR 400. We guarantee that you will receive at least 100 real Rupees. How much you win depends upon how you play, as well as how the other Ps play in the game. In the game, we play with play Rupees. At the end of the game, we will exchange 1000 play Rupees for one real Indian Rupee. The money we give you is not our private money, but comes from the*

*International community via (identity information removed for review process).]*

*The team represented here is working for (identity information removed for review process) and (identity information removed for review process). (Identity information removed for review process) is an international institute that is conducting agricultural research that will help farmers all over the world improve their living conditions. (Identity information removed for review process) is a NGO working all over India on different aspects of rural development in cooperation with many international partners.*

*We have gathered 14 people today to play our game. You will play in two groups of seven players each, but at the beginning of the game, you will not know who plays with whom in one group. We will tell you only later during the game.*

*All of the information we collect during this game is treated confidentially. Only summary results are made available to different stakeholders at a later stage. We will return to share our scientific results with you. However, the main purpose of the exercise is to encourage discussion within the community and we hope that in this way it will be beneficial for you immediately. We will not bring any grants and will not start a project here. The benefits we hope that you will receive from us are the new ideas. At the same time, our study is likely to help the watershed department implement and manage watershed projects better.*

*We will explain the game step by step. You should listen to the instructions very carefully and ask questions at any point. We will conduct short quizzes to see if you understand the game. You can only participate in the game when you understand it fully. The game will be played in different rounds and we will have discussions in between in clearly dedicated time slots. The entire workshop will take approximately two hours.*

*We will introduce different rules during our explanations. Please ask us if you do not understand any of the rules fully. If we observe that someone is not following the rules, we will explain the rules again first. If anyone breaks the rules repeatedly, we have to exclude her/him from the game and no payments will be made to that person.*

## **A Stop Dam as a Common Pool Resource**

### **General Explanation**

*The game is all about maintaining stop dams in your village. The dams support the recharge of open wells downstream of them. This affects an area of up to four kilometers downstream, although the benefits decrease the farther away from the dam people have their wells and fields.*

*In our game, we assume a stop-dam of approximately 8,000 m<sup>3</sup>. A dam with this capacity can store approximately 40.000 m<sup>3</sup> water over the year. Many communities agree that a certain amount of water needs to be made available for domestic use, watering livestock, fish production, and other non-irrigation uses. Considering this, we assume that communities allow farmers to take a maximum of 25.000 m<sup>3</sup> water for irrigation in the Rabi season. The farmers below the dam can use this water to irrigate their fields. The number of fields that can be irrigated depends, amongst other reasons, on the crops the farmers grow.*

*As you know, even if the stop dam is in good condition, it requires regular maintenance in terms of materials, labor, and hiring machinery. The water available for irrigation depends upon the amount invested in maintenance. We assume that every year at least 50 person-days of labor are required and materials need to be bought. We estimate that the annual maintenance costs to maintain the dam at full capacity are in the range of INR 20,000.*

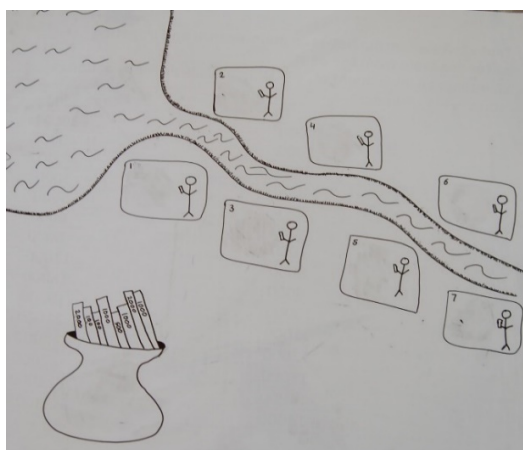
### **The Investment Decision**

*Now that you learned about the main idea of the game, we want to explain how investments for the maintenance of the dam are made and how you can earn money.*

*Table 2 shows a typical dam and seven fields downstream of the dam. Every field belongs to a farmer; player 1 is closest to the dam, and player 7 is the farthest away. Each of the farmers needs water to grow crops.*

Point at the dam and the different field positions to illustrate this structure:

**Table 2. The structure of the dam**



*The water can be received from the dam. How much water is available depends upon how well the dam is maintained—in any case, the water available is limited. Money is needed to maintain the dam. This money comes from the investments you as a group can make voluntarily.*

*In every game round, we will give each of you 3,000 play Rupees. Consider that this money is money you have left at the end of every month. You can decide freely how to use it. You have the opportunity to invest money in the dam's maintenance, or you can keep the money for yourself and use it for household expenditures. Any amount you do not invest remains in your personal account and no one can touch it. The money you invest will be put into the group account.*

Draw some arrows from the players to the pot on Table 2 to symbolize the investment.

*The relation between the water available for irrigation and the investment in the dam's maintenance can be seen in Table 3. Depending upon how much the group invested, the dam will have water available for irrigation. The water stored increases greatly with average investments. These calculations are made on the basis of experiences of (identity information removed for review process) in your area.*

Point at the first and second columns of the table and show how the amount of water increases with the amount of money invested.

*Now, for example, imagine your group made an overall investment of INR 16,000.*

Circle the 16,000 on Table 3 and write 16,000 in the pot on Table 2.

*This will yield 21,000m<sup>3</sup> of water to irrigate your fields.*

Circle the 21,000 on Table 3 and write 21,000 in the dam on Table 2.

**Table 3. Relationships between choices**

Maintenance Investment of Group in Play Rupees	Water Available for Irrigation in Cum	Water Sufficient to Irrigate No. of Hectares with Gram	Water Sufficient to Irrigate No. of Hectares with Wheat
below 5000	below 3000	0 ha	0 ha
5000	3000	1 ha	0 ha
6000	3000	1 ha	0 ha
7000	4000	1 ha	0 ha
8000	4000	1 ha	0 ha
9000	5000	1 ha	0 ha
10000	5000	1 ha	0 ha
11000	6000	2 ha	1 ha
12000	8000	2 ha	1 ha
13000	11000	3 ha	2 ha
14000	16000	5 ha	2 ha
15000	19000	6 ha	3 ha
16000	21000	7 ha	3 ha
17000	22000	7 ha	4 ha
18000	22000	7 ha	4 ha
19000	23000	7 ha	4 ha
above 19000	23000	7 ha	4 ha

*You can use this water to irrigate your fields and grow a Rabi crop. Each of you can choose between two crops, wheat or gram. You can see in Table 4 the differences between growing gram or wheat.*

**Table 4. Crops' income and water requirement**

	Net Return per ha in INR	Water Requirement per ha in Cum
<b>Wheat</b>	15000	5500
<b>Gram</b>	13000	3000

*Taking all costs and labor inputs into account, wheat gives you a better return per acre than gram, but gram requires substantially less water: Wheat requires 5500 m<sup>3</sup> and gram 3000 m<sup>3</sup> of water.*

Point at the different returns and water requirements (use Table 4).

*The amount of crops that can be grown with any investment is calculated in the third and fourth column of Table 4.*

Point to the third and fourth respective columns of Table 4 and show the relation between investment, amount of water available, and the amounts of wheat and gram the farmers can grow.

*In this example, your group made an overall investment of 16,000. With the 21,000m<sup>3</sup> available, each of you seven can either grow 1 ha of gram, or four of you can grow 1 ha of wheat each.*

Point to the third and fourth respective columns of Table 4 to show the numbers.

*In the first case, all of you receive returns and make a profit. However, in the latter case, there is not enough water left for the remaining three players to grow any crops. Thus, only four receive some return, while the other three farmers make no return despite their investment in the dam.*

Use Table 4 to illustrate this case.

*However, the investments are not high enough in every case for every farmer to potentially grow crops and make profits. Consider the case in which your group made an overall investment of INR 11,000.*

Circle the 11,000 on Table 3 and write 11,000 in the pot on Table 2.

*This will yield 6000m<sup>3</sup> of water to irrigate your fields.*

Circle the 6000 on Table 3 and write 6000 in the dam on Table 2.

*Again, you can use this water to irrigate your fields and grow wheat or gram. However, with the 6000m<sup>3</sup> available, only two of you can each grow 1 ha of gram, or one of you can grow 1 ha of wheat.*

Point to the third and fourth respective columns of Table 3 to show the numbers.

*In both cases, there is not enough water for all farmers to grow crops. Again, these earn no return despite their investment in the dam.*

Use Table 3 to illustrate this case.

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*To make your investment decision, we will give you two envelopes, an orange one and a red one. In the orange one, you will find 3,000 play Rupees; the red envelope is empty. If you want to invest money in the dam's maintenance, please transfer the amount you would like to invest to the red envelope.*

*At the time when the decisions are made, each player acts independently without consulting anyone else. You are not allowed to talk to each other or say anything. To ensure that you can make decisions independently, everyone will be seated in such a way that no one is able to see other players' decisions.*

*We will now practice this with seven of you.*

Select seven players and place them in the front. Please hand over the two envelopes prepared.

*Now you can decide freely how much of your 3,000 play Rupees you want to invest in the maintenance of the stop dam. Please move as much play money from the orange to the red envelope as you want to invest in maintaining the dam. Please do it in a discreet way. Once you have made your decision, please hand both envelopes to the facilitators. All individuals make their decisions at the same time and without talking or consulting with anyone. We will then calculate how much your group has invested in the dam's maintenance.*

Once you get all of the envelopes, type the individual amounts invested into the Excel-table. In addition, circle the amount the group invested and the amount of water available in Table 3 and write both numbers in the pot and the dam in Table 2.

*Your group made an investment of  $X$  play Rupees, which yields  $Y \text{ m}^3$  of water available for irrigation.*

### **The Crop Choice Decision**

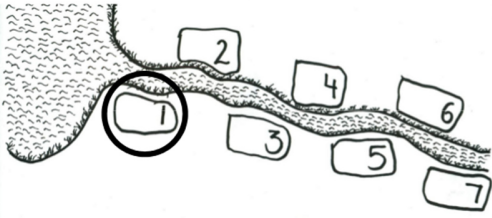


*Now, we come to the second decision of each round, which concerns the distribution of the dam water and the choice of crops.*

*We will distribute one card to each of you. In the upper part, you see a drawing, as here on the wall. There is a dam, a channel, and seven fields. You can find your field position on this card: it is the circled field. Keep this position in mind, as the water flows from the top to the bottom. The farmers farther up can take the water first and the next farmer can take only from what is left. This continues until there is no water left.*

*In the lower part of the card, you can mark which crop you want to grow: tick the left box if you want to grow gram, and the right box if you want to grow wheat. Whether you will indeed get the income from this crop will depend upon whether there was enough water available to grow it. This depends upon 1) how much the group has invested in the dam, and 2) on how much water the players above you have taken. We will give you the following decision cards in every round.*

Show the empty crop choice decision cards (Figure 1) and hand them out to the players.

**Figure 1. Decision card for crop choices**

Player No: 1	Round:
	
	Grow gram (income 13,000 INR/ha & water requirement 3000 cum/ha) <input type="checkbox"/>
	Grow wheat (income 15,000 INR/ha & water requirement 5500 cum/ha) <input type="checkbox"/>

*Please tick the box next to the crop you want to grow! Please do it so that no one can see your decision! Whether you can indeed grow this crop depends upon how much water is left to you at the end. Nevertheless, you will not face any costs if you selected a crop, but it could not be grown. If you chose to grow wheat, but there is only enough water for gram, we will change your crop choice to gram automatically.*

Collect the Crop Choice Cards. Enter the data in the Excel sheet. Finally, write each player's return and crop choice in each player's field on the picture. Read the numbers aloud. Explain the result.

*We will now practice this with the other seven players.*

Repeat the procedure with the other seven players.

*Once all players have made their decisions, we will inform you about your income in this round using the balance sheet. You will be given a balance sheet that tells you how much you have earned in the last round.*

Show empty balance sheet (Figure 2):



Figure 2.            Players' balance sheet

Player No. 1	
Round No.	Balance after completing this round
1	
2	
3	
4	
5	
6	
7	

Once you have all Crop Choice Cards, type the decisions into the Excel-table. The table will calculate the individual earnings; write the player's earnings on her/his balance sheet. Put the filled balance sheet into the brown envelope, move all play money from the brown back to the white envelopes, and hand back the envelopes.

*This is how the game is played, but before we start the real game, please answer the following question!*

### Hypothetical Question

The following question will give us an idea about the player's more general attitude.

*We will now give you the Crop Choice Cards for the first time. Imagine that there are 21,000m<sup>3</sup> of water available in the dam. Which crop would you choose? Please tick on the decision card and give it back to us.*

Please record the players' choice in the Excel file in the "Initial Information" tab.

### The Actual Game

After all players understand the game well, we play one test round. If it becomes apparent during the test round that additional information is needed, than we will explain these aspects again. Otherwise, we play the game with them and record all decisions.

Before every round, prepare the brown and white envelopes by always putting 3,000 play Rupees into the white envelopes.

*Now, please turn around and sit in a way that no one is able to see each other's decisions. Now we start the game.*

Please hand out the white and brown envelopes.

*All of you please decide how much you want to invest in the dam's maintenance. Place this amount secretly into the brown envelope.*

After all group members have made their decision, collect all envelopes. Record every player's contribution in the Excel table, which will help you calculate the water available to the group in this round. Mark the amount of water on Table 3 in front and hand out the crop decision cards.

*Now you can see the water available to all of you in this round marked here in front. Please tick on your crop choice decision card which crop you want to grow in this round. Do not talk to anyone.*

After all group members have made their decision, collect the crop choice decision cards, and record every player's choice in the Excel table. This will help you calculate each player's income in this round. Write each player's earnings on the balance sheet and give the cards back in such a way that other players cannot see them.

*Now that you have had this experience, we want to see what you decide now. Let us play the game for five rounds to see whether anything changes.*

Repeat the procedure 5 times!

### **Discussion**

Allow players to discuss after every game round. Avoid interfering into these discussions! Record the discussion content as summary!

As a variation of the game, village members who are observers can participate in the discussion. If this is the case, please note this down in your discussion report.

### **Communication and Social Information Treatment**

As a first treatment, we introduce communication and social information. This is important, as our game is supposed to initiate a learning effect within the group. This effect is strongest if people can discuss their experiences in the game.

We mix the position of the players to ensure that their anonymity in treatment one is protected. Excel does this automatically. The new allocation of positions can be found in the Excel file in the "Initial Information" tab. Thus, make sure that you change the crop choice cards before you start to explain the treatment. Write all of the players' names on the two Record posters too.

*Now you play the same game for another five rounds, but from now on, at the end of each round, we will tell you how much each player contributed and earned. We use this poster for this purpose. You will also naturally find out with whom you are playing.*

Show the empty Record Poster (Table 5)!

**Table 5. Record poster**

	Player 1			Player 2			Player 3			Player 4			Player 5			Player 6			Player 7			Total	
Round	Investment	Earning	Crop choice	Investment	Earning	Crop choice	Investment	Earning	Crop choice	Investment	Earning	Crop choice	Investment	Earning	Crop choice	Investment	Earning	Crop choice	Investment	Earning	Crop choice	Group investment	Group earning
6																							
7																							
8																							
9																							
10																							

*In addition, you can now discuss amongst yourselves as soon as you have given back the envelopes and decision cards and once we have written all of the players' contributions and earnings on the Record Poster. To keep the exercise short, you have a maximum of five minutes of discussion for every round. In case you finish earlier, you can just give us your envelopes.*

It is very important to note down the content of the discussion. You can summarize the content, but please include all arguments, agreements, complaints, and praises.

In addition, please use the communication record sheet (Table 6) to tick how often every player made statements of the following kinds:

- Proposing rule
- Agreeing with rule
- Rejecting rule
- Praise
- Blame/complaint
- Proposing punishment
- Proposing reward
- Statement unrelated to the game

From now on, you do not have to write the earnings of each round on the balance sheet because it is written on the poster below. Before every round, prepare the envelopes by always putting 3000 play Rupees into the white envelopes! Please also clean the crop choice decision cards. Please hand over the white and brown envelopes.

**Table 6. Communication record sheet**

Village:					Round:				
	Propose rule	Agree to rule	Reject rule	Argues/ defends	Praise	Blames/ complains	Propose punishment	Propose reward	Not connected
Player 1									
Player 2									
Player 3									
Player 4									
Player 5									
Player 6									
Player 7									
Player 8									
Player 9									
Player 10									
Player 11									
Player 12									
Player 13									
Player 14									

*All of you please make your investment decisions.*

After all group members have made their decision, we will calculate the water available to the group in the round and mark it on Table 3 in front. Please hand out the crop decision cards.

*Now you can see the water available to all of you in this round marked here in front. Please tick on your crop choice decision card which crop you want to grow in this round.*

After all group members have made their decision, collect the crop choice decision cards. Record every player's crop choice in the Excel table. The table will help you calculate each player's income in this round. Write the individual earnings on the Record Poster (Table 5) in front.

*You now have 5 minutes time to discuss amongst yourselves.*

Please watch the time and record the discussion both on the Communication record sheet (Table 6) as well as by taking summary notes.

*Now that you have had this experience, we want to see what you decide now. Let us play the game for five rounds to see whether anything changes.*

Repeat the procedure 5 times!